

## **APPENDIX 9**

### **WATER QUALITY SUMMARY**

#### **Beneficial Uses Of Water**

Existing water quality requirements are described in the *Water Quality Control Plan for the North Coast Basin* (1996) (Basin Plan), which is the tool for comprehensive water quality planning as set forth in both California's Porter-Cologne Water Quality Control Act and the federal Clean Water Act. Among other things, the Basin Plan describes the existing and potential beneficial uses of the surface and ground waters in each of the watersheds throughout the North Coast Region. It also identifies both numeric and narrative water quality objectives, the attainment of which is considered essential to protect the identified beneficial uses.

The Basin Plan identifies the following existing beneficial uses of water in the Gualala River basin:

- Municipal and Domestic Supply (MUN)
- Agricultural Supply (AGR)
- Industrial Service Supply (IND)
- Recreational Uses (REC-1 & REC-2)
- Commercial and Sport Fishing (COMM)
- Cold Freshwater Habitat (COLD)
- Wildlife Habitat (WILD)
- Rare, Threatened, or Endangered Species (RARE)
- Migration of Aquatic Organisms (MIGR)
- Spawning, Reproduction, and/or Early Development (SPWN)
- Estuarine Habitat (EST)

The beneficial uses identified above as COMM, COLD, MIGR, WILD, RARE, SPWN, and EST are all related to the Gualala River watershed's cold water fisheries. Beneficial uses associated with the cold water fisheries are among the most sensitive in the watershed. As such, protection of these beneficial uses is presumed to help protect any of the other beneficial uses that might also be harmed by sedimentation.

The COMM beneficial use applies to water bodies in which commercial or sport fishing occurs or historically occurred for the collection of fish, shellfish, or other organisms, including, but not limited to, the collection of organisms intended either for human consumption or bait purposes. The COLD beneficial use applies to water bodies that support or historically supported cold water ecosystems, including, but not limited to, the preservation or enhancement of aquatic habitats, vegetation, fish, or wildlife, including invertebrates. The WILD beneficial use applies to water bodies that support terrestrial ecosystems including, but not limited to, preservation and enhancement of terrestrial habitats, vegetation, wildlife (e.g., mammals, birds, reptiles, amphibians, invertebrates), or wildlife water and food sources. The RARE beneficial use refers to water bodies that support habitats necessary, at least in part, for the survival and successful maintenance of plant or animal species established under state or federal law as rare, threatened or endangered. The MIGR beneficial use applies to water bodies that support or historically supported the habitats necessary for migration or other temporary activities by aquatic organisms, such as anadromous fish. The SPWN beneficial use applies to water bodies that support or historically supported high quality aquatic habitats suitable for the reproduction and early development of fish. The EST beneficial use applies to water bodies that support or historically supported estuarine ecosystems, including, but not limited to, the preservation or enhancement of estuarine habitats, vegetation, fish, shellfish, or wildlife (e.g., estuarine mammals, waterfowl, shorebirds).

## Water Quality Objectives

The Porter-Cologne Water Quality Control Act specifies that each regional board shall establish water quality objectives which, in the regional board's judgment, are necessary for the reasonable protection of the beneficial uses and for the prevention of nuisances. The water quality objectives are considered to be necessary to protect those present and probably future beneficial uses stated above and to protect existing high quality waters of the state. As new information becomes available, the Regional Water Board will review the appropriateness of existing and proposed water quality objectives and amend the Basin Plan accordingly.

The following is a summary of water quality objectives for the Gualala River watershed according to the Basin Plan, as amended in 1996.

### NARRATIVE WATER QUALITY OBJECTIVES

Objective	Description
Color	Waters shall be free of coloration that causes nuisance or adversely affects beneficial uses.
Tastes and Odors	Waters shall not contain taste- or odor-producing substances in concentrations that impart undesirable tastes or odors to fish flesh or other edible products of aquatic origin, or that cause nuisance or adversely affect beneficial uses.
Floating Material	Waters shall not contain floating material, including solids, liquids, foams, and scum, in concentrations that cause nuisance or adversely affect beneficial uses.
Suspended Material	Waters shall not contain suspended material in concentrations that cause nuisance or adversely affect beneficial uses.
Settleable Material	Waters shall not contain substances in concentrations that result in deposition of material that causes nuisance or adversely affect beneficial uses.
Oil and Grease	Waters shall not contain oils, greases, waxes, or other materials in concentrations that result in a visible film or coating on the surface of the water or on objects in the water, that cause nuisance, or that otherwise adversely affect beneficial uses.
Biostimulatory Substance	Waters shall not contain biostimulatory substances in concentrations that promote aquatic growths to the extent that such growths cause nuisance or adversely affect beneficial uses.
Sediment	The suspended sediment load and suspended sediment discharge rate of surface water shall not be altered in such a manner as to cause nuisance or adversely affect beneficial uses.
Temperature	The natural receiving water temperature of intrastate waters shall not be altered unless it can be demonstrated to the satisfaction of the Regional Water Board that such alteration in temperature does not adversely affect beneficial uses. At no time or place shall the temperature of any COLD water be increased by more than 5°F above natural receiving water temperature.
Toxicity	All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life.
Pesticides	No individual pesticide or combination of pesticides shall be present in concentrations that adversely affect beneficial uses. There shall be no bioaccumulation of pesticide concentrations found in bottom sediments or aquatic life.
Chemical Constituents	Waters designated for use as agricultural supply (AGR) shall not contain concentrations of chemical constituents in amounts which adversely affect such beneficial uses.
Radioactivity	Radionuclides shall not be present in concentrations which are deleterious to human, plant, animal or aquatic life nor which result in the accumulation of radionuclides in the food web to an extent which presents a hazard to human, plant, animal, or indigenous aquatic life.

### Numeric water quality objectives

Objective	Description
Turbidity	Turbidity shall not be increased more than 20 percent above naturally occurring background levels.
pH	The pH of waters shall always fall within the range of 6.5 to 8.5.
Dissolved Oxygen	At a minimum, waters shall contain 7.0 mg/L at all times. Ninety percent of the samples collected in any year must contain at least 7.5 mg/L. Fifty percent of the monthly means in any calendar year shall contain at least 10.0 mg/L.
Bacteria	The bacteriological quality of waters of the North Coast Region shall not be degraded beyond natural background levels. Based on a minimum of not less than five samples for any 30-day period, the median fecal coliform concentrations in waters designated for contact recreation (REC-1) shall not exceed 50/100 ml. Nor shall more than ten percent of total samples during any 30-day period exceed 400/100 ml.
Specific Conductance	Ninety percent of the samples collected in any year must not exceed 220 micromhos at 77°F. Fifty percent of the monthly means in any calendar year shall contain at least 125 micromhos at 77°F.
Total Dissolved Solids	Ninety percent of the samples collected in any year must not exceed 115mg/L. Fifty percent of the monthly means in any calendar year shall contain at least 75 mg/L.

### Prohibitions

In addition to water quality objectives, the Basin Plan includes two discharge prohibitions specifically applicable to logging, construction, and other associated non-point source activities. The prohibitions state:

- The discharge of soil, silt, bark, slash, sawdust, or other organic and earthen material from any logging, construction, or associated activity of whatever nature into any stream or watercourse in the basin in quantities deleterious to fish, wildlife, or other beneficial uses is prohibited.
- The placing or disposal of soil, silt, bark, slash, sawdust, or other organic and earthen material from any logging, construction, or associated activity of whatever nature at locations where such material could pass into any stream or watercourse in the basin in quantities which could be deleterious to fish, wildlife, or other beneficial uses is prohibited.

Development and implementation of a Total Maximum Daily Load (TMDL) is one means of attaining water quality objectives and protecting beneficial uses in the Gualala River. The TMDL program is required by Section 303(d)(1)(A) of the Clean Water Act (CWA) that states, "Each State shall identify those waters within its boundaries for which the effluent limitations . . . are not stringent enough to implement any water quality standard applicable to such waters." The same part of the CWA also requires that the State "establish a priority ranking for such waters, taking into account the severity of the pollution and the uses to be made of such waters." Gualala River was included on the 1996 and 1998 lists based on the finding that sedimentation is, in part, responsible for the impairment of the cold water fisheries. Section 303(d)(1)(C) of the CWA requires that "Each State shall establish for the waters identified in paragraph (1)(A) of this subsection, and in accordance with the priority ranking, the total maximum daily load..."

"As part of California's 1996 and 1998 303(d) list submittals, the North Coast Regional Water Quality Control Board (RWQCB) identified the Gualala River as water quality limited due to sediment loading and designed the watershed as a high priority for TMDL development. The RWQCB published a Technical Support Document for the TMDL in 2001 (CWQCB 2001).

### Gualala River Watershed – Discharger Information

#### The Annapolis Milling Company

The Annapolis Milling Company, Incorporated, owns and operates a conventional sawmill near the town of Annapolis in western Sonoma County. The facility is located in the NW1/4, SE1/4 of section 7, T10N, R13W, MDB&M. The facility consists of a sawmill, equipment maintenance shed, and a five acre dry log deck.

Stormwater runoff from the log deck flows to the west towards Grasshopper Creek and to the east towards an unnamed tributary of Buckeye Creek, both major tributaries of the South Fork Gualala River. Domestic waste is discharged to a septic tank/leachfield system. Steam cleaning waste is discharged onto the ground. Log deck cleanup/solid waste is disposed of at the Sonoma County landfill near Annapolis. Wood shavings and sawdust is sold as landscaping material. The Regional Board adopted Waste Discharge Requirements Order No. 85-176 on December 5, 1985, for this facility.

Comments or Issues -

There is a former underground storage tank (UGST) site at the sawmill which is being handled by the Sonoma County Health Department. The tank was removed in 1989, and in March 1990 a remediation workplan was approved and soil excavation began.

In February 1995, staff reported that this facility had not submitted any Self Monitoring Reports since July of 1994, which could result in a violation.

In April 2000, staff inspection found that mill operations were substantially unchanged over the past decade. Bark waste is now sold to reuser in Cloverdale, and vineyards are being planted over some of the area formerly used for decking logs.

Recent violations consisted of repeatedly failing to record discharge observations. Several staff inspections in 2000 noted that there was no copy of the storm water pollution prevention plan, storm water permit, or monitoring program available on site.

Mendocino County, South Coast Solid Waste Disposal Site. (SWDS)

The County of Mendocino is the owner and operator of a Class II-2 solid waste disposal site located approximately five miles east of Highway 1 in the S1/2 of Section 4, T11N, R15W, MDB&M. The disposal site property contains 47 acres while the active portion of the disposal site included approximately 10 acres located adjacent to the (Little) North Fork Gualala River. The landfill is unlined and has been in operation since 1970. The landfill is located over the San Andreas Fault and borders the Little North Fork of the Gualala River, located approximately 50 feet southwest of the site. Land within 1000 feet of the disposal site is unimproved forest and range land. The discharger is operating the site as a fill and cover operation with waste being placed in layers behind a compacted earth barrier that is keyed into the native soils. Surface drainage is diverted around the fill area. This disposal site is now in the process of closure.

Comments or Issues -

A staff inspection of the site on February 26, 1987 revealed that a pond used to control sediment discharges from the site was filled to capacity with a liquid that was confirmed to be leachate. The liquid was flowing into the pond from a seep at the toe of the active face of the fill. The pond is located less than a quarter mile from the Little North Fork Gualala River.

In February 1994, staff reported the violation of a broken leachate tank which discharged 2000 gallons to surface water, and a sediment pond discharge pipe triggered a small mudslide to creek.

In April 1995, staff indicated a need to resolve the groundwater separation issue and VOC's reported in monitoring wells.

In May 2000, staff inspection reported that a berm had recently been constructed around the active face of a site to contain leachate. A broken leachate pipe was evident within the berm. The timing of berm placement with respect to origin of leachate flow may have been delayed, and might not have been installed soon enough.

Gualala Community Services District Wastewater Treatment and Disposal Facilities

In January 1992, the Gualala Community Services District submitted a report of waste discharge for the operation of a new wastewater treatment plant located in the NW ¼ of Section 26, T11N, R15W, MDB&M, South of the

Community of Gualala in Northwest Sonoma County. The treatment plant is located in the watershed of the Gualala River and the Pacific Ocean.

The discharger proposes to treat wastewater to a secondary level using an aerated pond and polishing clarifier. Solids from this treatment process are retained in a sludge basin and will be removed to an approved disposal site on a periodic basis. Following treatment, the water is stored in ponds and used to irrigate the Sea Ranch Golf Links.

#### Comments or Issues -

July 1992, an estimated 11,000 gallons of secondary treated, filtered and disinfected wastewater was discharged to Salal Creek.

October 1992, an estimated 40,000 gallons of secondary treated, filtered and disinfected wastewater was discharged to Salal Creek.

January 1993, an estimated 20,000 gallons of treated, un-disinfected wastewater was discharged to a tributary of the Gualala River, and the Gualala River.

May 1993, an estimated 100,800 gallons of advanced treated wastewater was discharged to Salal Creek.

From February 12, 1994 to March 1, 1994 an estimated 900,000 gallons of advanced treated wastewater was discharged to a tributary of the Gualala River and the Gualala River in violation of waste discharge requirements prescribed by the Regional Board.

In June 1995, approximately 584,00 gallons of wastewater was discharged to Salal Creek and the ocean.

In February 1996, there was a discharge of untreated wastewater from the Villa Del Mar Trailer Park in Gualala. It is believed that a good quantity of the discharged waste (8,000 to 10,000 gallons) flowed into China Gulch, into the Gualala River, and out to sea.

#### Gualala Aggregates, Inc.

Gualala Aggregates, Inc., operates a sand and gravel plant located adjacent to the South Fork Gualala River west of Annapolis in Section 22, T10N, R14W, MDB&M. Washwater from the plant is discharged to evaporation/percolation ponds adjacent to the South Fork Gualala River. The Board adopted Order No. 78-135, Waste Discharge Requirements for this facility, on August 24, 1978.

#### Comments or Issues -

February 1997, a large discharge of fresh concrete had been dumped on a creek bank slope and entered a tributary to Big Gulch Creek. This concrete channel extended from the slide area approximately 250 feet downstream. It was also suspected that this hillside was used for rinsing out the trucks. Remedial actions were to manually break up and remove the concrete from the channel, and revegetate the hillside.

#### **Water Quality Data – historical and current**

The water quality analysis included comparison of available data to water quality objectives from the Basin Plan, Total Maximum Daily Load suggested targets, and EMDS dependency relationships (thresholds) and other ranges and thresholds derived from the literature (Table 1). With the exception of the Basin Plan objectives, these ranges and thresholds are not legal regulatory numbers. Rather, they are based on information available at the time and are expected to change as new data and analyses become available.

The D<sub>50</sub> ranges are based on a study by Knopp (1993) who measured a variety of instream parameters on a number of North Coast streams. He presented results for a group of 18 watersheds judged to have had no human disturbance history or little disturbance within the last 40 years. The mean D<sub>50</sub> value of this data set was 69 mm. The minimum measured value was 37 mm, and the maximum was 183 mm. The intent in the analyses in this assessment is to evaluate the available data against Knopp's distribution. It is not the intent to suggest 37 mm as a minimum value independent of other information about the distribution of the data.

The temperature range for “fully supportive conditions” of 50-60 F (10-15.6 C) was developed as an average of the needs of several cold water fish species, including coho salmon and steelhead trout. As such, the range does not represent fully supportive conditions for the most sensitive cold water species (usually considered to be coho).

The lethal maximum temperature of 75 F (23.9 C) was derived from literature review presented in RWQCB (2000). Peak temperatures are important to consider as they may reflect short-term thermal extremes that, unless salmonids are able to escape to cool water refugia, may be lethal to fish stocks. The literature supports a critical peak lethal temperature threshold of 75 F (24 C), above which death is usually imminent for many Pacific Coast salmonid species (Brett, 1952; Brungs and Jones, 1977; RWQCB, 2000; Sullivan, et al., 2000).

The data we compared to these ranges and thresholds from a water quality perspective were:

- Continuous water temperature data from data loggers
- Percent fines < 0.85 mm from McNeil samples
- D<sub>50</sub> from pebble counts
- Dissolved oxygen, pH, conductance (dissolved solids), nutrients (nitrogen, phosphorus)

Turbidity and suspended solids data were not available for this assessment, and represent a limitation in the water quality part of the assessment. The data and summary plots are included in Appendix 9.

**Table 1.** In-channel criteria used in the assessment of water quality data.

<b>Water Quality Parameter</b>	<b>Range or Threshold</b>	<b>Source of Range or Threshold</b>
<b>pH</b>	6.5-8.5	Basin Plan, p 3-3.00
<b>Dissolved Oxygen</b>	7.0 mg/L	Basin Plan, p 3-3.00
<b>Temperature</b>	No alteration that affects BUs <sup>1</sup>	Basin Plan, p 3-3.00
	No increase above natural > 5 F	Basin Plan, p 3-4.00
	50-60 F MWAT <sup>2</sup> – proposed fully supportive	EMDS proposed Fully Supportive Range <sup>3</sup>
	75 F daily max (lethal)	Cold water fish rearing, RWQCB (2000), p. 37
<b>Sediment</b>		Basin Plan, p 3-2.00
Settleable matter	Not to cause nuisance or adversely affect BUs	
Suspended load	Not to cause nuisance or adversely affect BUs	Basin Plan, p 3-2.00, 3-3.00
Turbidity	no more than 20 percent increase above natural occurring background levels	Basin Plan, p 3-3.00
Percent fines <0.85 mm	<14% in fish-bearing streams <sup>4</sup>	Gualala TSD, CRWQCB (2001)
Percent fines <6.4 mm	<30% in fish-bearing streams	Gualala TSD, CRWQCB (2001)
V* in 3 <sup>rd</sup> order streams with slopes 1-4 % <sup>5</sup>	≤0.15 (mean) <0.45 (max)	Gualala TSD, CRWQCB (2001)
Median particle size (d <sub>50</sub> ) in 3 <sup>rd</sup> order streams of slopes 1-4 %	>69mm (mean) >37mm (min)	Knopp (1993)

<sup>1</sup> BUs = Basin Plan beneficial uses

<sup>2</sup> MWAT=maximum average weekly temperature, to be compared to a 7-day moving average of daily average temperature

<sup>3</sup> EMDS = Ecological Management Decision Support model used as a tool in the fisheries limiting factors analysis. These ranges and thresholds were derived from the literature and agreed upon by a panel of NCWAP experts.

<sup>4</sup> fish-bearing streams=streams with cold water fish species

<sup>5</sup> V\* is the percentage of residual pool volume occupied by sediment depositions

<sup>6</sup> CDFG=Calif. Department of Fish and Game habitat threshold

## Basic Water Chemistry

General water quality data were available from:

- StoRet data from USEPA are available for three sites on the Gualala River from: Gualala River near Gualala monthly from February 13, 1975 to April 4, 1985, Wheatfield Fork at the YMCA camp on January 6 and June 3, 1988, and South Fork at Valley Crossing in April and September from 1974 to 1988. All those data indicate a moderately hard water oligotrophic stream with pH slightly above neutral, high dissolved oxygen, low dissolved solids, and low nutrients (nitrogen and phosphorus). There were no large differences among the stations, though South Fork pH and hardness values were somewhat higher than in the Gualala.
- RWQCB sampling on February 13, May 8, and June 27 at five stations: House Creek, Wheatfield Fork near Valley Crossing, South Fork at Hauser Bridge and near Valley Crossing, and mainstem Gualala River at the Regional Park. All the data indicate a moderately oligotrophic waterbody—low nitrogen and phosphorus levels, moderately buffered, moderately hard water, low heavy metals concentrations, low organic load.

## Water Temperature

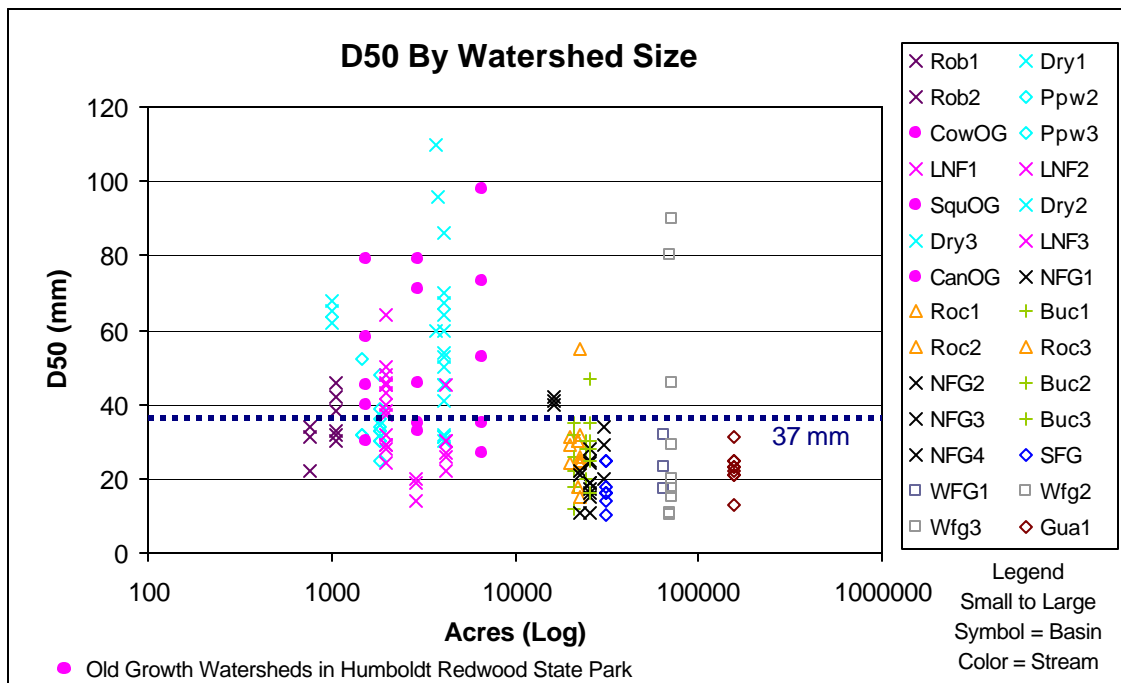
Water temperatures expressed as the highest of the floating weekly average for the summer (MWAT) for the Gualala River watershed overall are normally distributed, but bimodally: about 47% of the values are in the first mode of 57-61 F, and 40% in the second mode of 64-70 F range. There appears to be little temporal trend at any one site, however there are some interesting relationships in some of the sub-watersheds. Most of the sites are above the proposed “fully supportive” range of 50-60 F (10 to 15.6 C) MWAT, however tributaries in the North Fork basin are generally lower. More relationships on a sub-watershed basis are provided in subsequent sections of this report.

## In-Channel Sediment

Streambed core samples are difficult to use in describing conditions on a reach scale, due to variability in the riffles and method. However, the core sample results for the Gualala River watershed are useful in a general sense to provide a coarse idea of conditions, but carry a high level of uncertainty due to small sample sizes (n=8). For those reasons, we cannot say anything definitively regarding percent fine materials in spawning riffles and their distribution throughout the watershed, rather comment regarding specific areas. The Gualala TMDL proposes a target maximum of 14% fines <0.85 mm and less than or equal to 30% fines <6.4 mm.

Pebble counts provide a good measure of the surface composition of the streambed. Trends toward smaller sizes indicate influx of fine sediments and either low stream power or transport capability overwhelmed by small particles (inability to move new sediment through the area). Trends towards larger particles indicate a flushing of smaller particles and sediment transport capability exceeding the influx of new sediment. The Gualala TMDL does not propose a median particle ( $D_{50}$ ) target, however the targets contained in the Garcia TMDL are 37mm as a minimum and 69mm as a mean in third order streams of 1-4% gradient. For the watershed overall,  $D_{50}$  values ranged from 10-110 mm.

GRI provided the following plot of  $D_{50}$  versus watershed size with the Gualala River data points, as well as for some streams in Humboldt County which contain varying amounts of old growth redwood. Differences in geology, soils, and climate have not been factored into the plot. No relationship of watershed size to  $D_{50}$  was obvious.



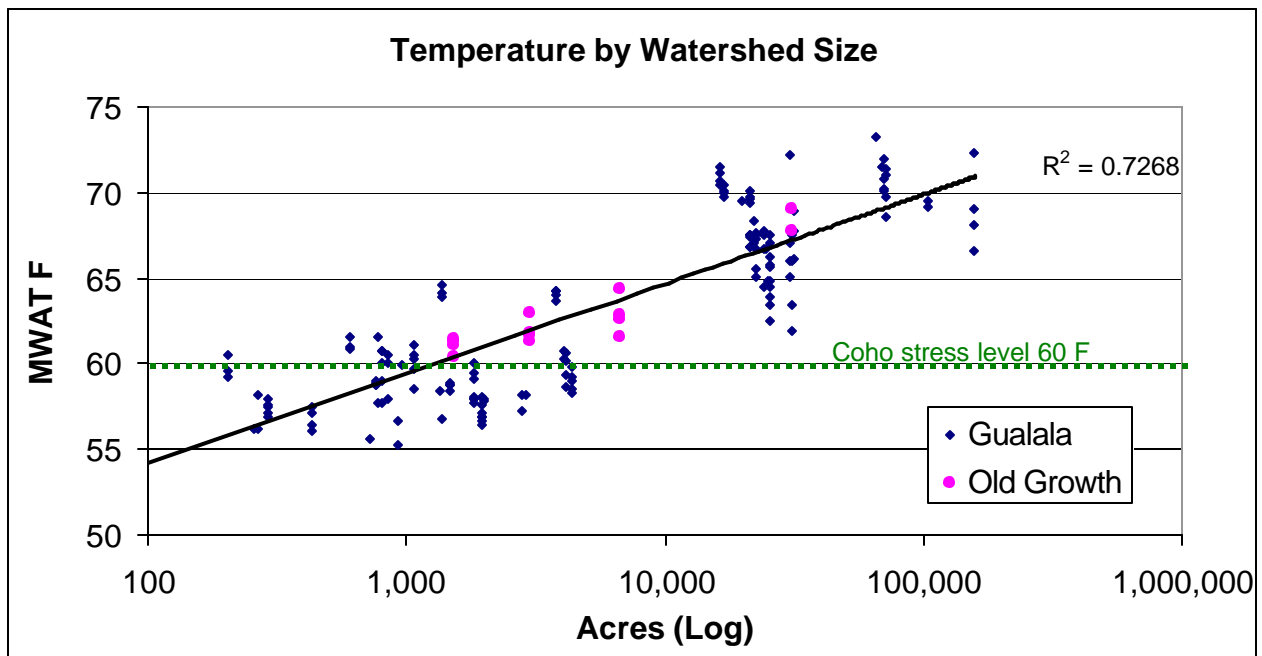
GRI also provided a plot of water temperatures expressed as MWAT for streams in the Gualala River watershed and the same Humboldt County streams as for the D50, above with the following explanatory text:

“Between 1994 and 2000, 154 continuous water temperature records were collected at 54 sites in the Gualala watershed. A trend has emerged indicating that smaller watersheds have lower water temperatures. The Forest Science Project’s report in 2000 found a similar trend.

It may be that the larger streams naturally have temperatures above the 60° F Coho stress level. To test this, Gualala temperatures were compared with temperatures collected in old growth watersheds in Humboldt Redwood State Park. The small circles in Figure \_\_\_ represent 14 continuous water temperature records collected at 4 sites between 1995 and 1999 by the Pacific Lumber Company. The old growth watersheds, by increasing acreage, are Cow Creek (93% uncut old growth), Squaw Creek (61% uncut old growth) Canoe Creek (62% uncut old growth) and Bull Creek, where the stream flows through 3 miles of uncut old growth, including the Rockefeller Grove, before it gets to the Bull Creek temperature station. The trend line equation for the old growth ( $y=2.2886\ln(x)+43.713$ ) was almost identical to the equation for the Gualala trend line ( $y=2.2707\ln(x)+43.683$ ). The  $R^2$  value for the old growth trend line was 0.8292.”

Differences in geology, hydrology, and climate are not accounted for in this plot. However, the relationship of increased temperatures with increased watershed size is evident, as water generally warms as it travels downstream. The ranges for any acreages are fairly high, spanning from about 2 F to 10 F. A normal log scale may be more appropriate, however the general relationship is apparent.

Water Quality staff take issue with the conclusion that higher temperatures in larger streams are natural. While water temperatures generally warm as one moves downstream (larger watershed area), the influences of climate and hydrology add complexity to the relationship, e.g., the situation observed in the Gualala River watershed with higher water temperatures coming off the eastern headwaters areas, then being cooled by tributary inflow, or larger contributions from the groundwater in some areas of a stream. Staff feel the statement is too broad.



The following pages contain the data available for analysis from the various sources.

## Water Temperature Data from GRI and GRWC

### North Fork Subwatershed MWATs & Maxs in F

Data Source: Gualala Redwoods, Inc.

Site	MWATs									Maxs								
	1994	1995	1996	1997	1998	1999	2000	2001		1994	1995	1996	1997	1998	1999	2000	2001	
dot256	55									57	64	64	62	63				
dot281					57									59				
dry213		61	61	62							63	63	64					
dry269	60				61					61				64				
dry212		64	64	64	64								69	69				
dry211		60	61	59	61		59	61			64	64	62	63		62	61	
Inf255	58									61								
Inf203	56	58	57	58	57	57	57	59		59	60	60	60	59	59	60	59	
Inf202	58									62								
Inf201	58	59	58	60	59						62	61	62	61				
Inf274		58	57								62	61						
mcg210		62									69							
mcg209		61	60	58							62	62	60					
nf205		64	64	65							71	69	70					
nf258	67									76								
nf214		70	70	70	71						75	75	75	76				
nf216		71	71	72							79	80	80					
nf204		64	66	65	64		63	64			69	68	67	68		68	68	
nf251			62	64				64				66	67				66	
nf272	71									76				71				
rob208		59	59	59	59						62	62	62	61				
rob263	60							61		64								
rob207		60	60	61	60		58	61			67	67	68	65		63	63	
rob206		58	58	57	58		57				69	62	62	62		64	63	
rob260	57									58								
lc215		59	59		61													
dry406					65													

### Rockpile Creek MWATs & Maxs in F

Data Source: Gualala Redwoods, Inc.

Site	MWATs									Maxs								
	1994	1995	1996	1997	1998	1999	2000	2001		1994	1995	1996	1997	1998	1999	2000	2001	
roc221		67	67	67	68		65	65			74	72	72	74		72	71	
roc222	67	67	67	68						71	74	72	72					
roc275				67	68								68	75				
roc276				57	57								59	59				
roc401					69									75				

## Water Temperature Data from GRI and GRWC (cont'd)

### **Buckeye Creek MWATs & Maxs in F**

Data Source: Gualala Redwoods, Inc.

	MWATs								Maxs							
Site	1994	1995	1996	1997	1998	1999	2000	2001	1994	1995	1996	1997	1998	1999	2000	2001
buc223		66	66	67		64		64		73	71	72	32	70		70
buc224		68	67	68			65			75	72	73			70	
buc231	67	70	69	70				69	71	76	75	75				76
buc235	65								70							

### **Wheatfield Fork MWATs & Maxs in F**

Data Source: Gualala Redwoods, Inc.

Site	MWATs							Maxs						
	1995	1996	1997	1998	2000	2001		1995	1996	1997	1998	2000	2001	
wf226	70	69	71	71				78	75	74	76			
wf227		70	72	71	70				75	78	76	78		
wf228	57	56	58	56				58	57	59	57			
wf273	72				72			80				77		
wf403				73							80			
wf620					73							82		
fc901					66							73		
fc618					66	63						72	70	
fc619					66	66						73	75	
fc608						64							70	
fc606						59							68	
wf612						72							79	
wf600						70							75	

### **Mainstem and South Fork MWAT & Maxs in F**

Data Source: Gualala Redwoods, Inc.

data Source: Cuddihill, Rabinowitz, and ...

Site	MWATs								Maxs							
	1994	1995	1996	1997	1998	1999	2000	2001	1994	1995	1996	1997	1998	1999	2000	2001
lpw220	58	61	59	61	60				60	67	64	62	64			
bpw218	58	59	58	60	59	58	58		61	62	61	63	63	61	61	
bpw219		59	58	59	59					63	62	64	63			
bpw248	59								63							
gh250			56								57					
gh277					56		58							57	64	
sf229		68	66	69						74	72	78				
sf230		66	65	72	67					73	71	76	73			
sf402					68		66						72		72	
gua217	67	69	68	72				72	73	78	76	76				72
gua225		69		69						77		72				
sf616							64	64							66	68
sf227							73	73							73	73
gua614							72	72							73	73
mck615							68	66							70	75
mck617							61	66							61	75
pcc621								73								75

**Median particle size data as the mean of 3 transects for the South Fork Gualala/Mainstem Gualala Subbasin. Source=GRI and GRWC, 2001.**

Site	Year	D50(mm)
sf402	1997	13
sf402	1999	20
gua217	1998	25
gua217	2000	20
gua225	1998	25
bpw218	1997	31
bpw218	1998	40
bpw218	1999	31
bpw219	1997	39

**Median particle size data (mm) as the mean of 3 transects for the Wheatfield Fork Gualala Subbasin. Source=GRI and GRWC, 2001.**

Site	1997	2000
wf226	45	30
wf227	34	
wf403	24	

**Median particle size data (mm) as the mean of 3 transects for the North Fork Gualala Subbasin. Source=GRI and GRWC, 2001.**

Site	1997	1998	1999	2000	2001
dry211	31	45	62	60	64
dry212	89				
dry405	65				
lnf404	26				37
lnf202	18				
lnf203	35	34	46	43	42
nf204	14		20		
nf216	41				
nf406	18				
nf473					28
rob207	38		36		
rob208	29				

**Median particle size data (mm) as the mean of 3 transects for the North Fork Gualala Subbasin. Source=CFL, 1997.**

Site	1995 - 1997
NGU 1	11
NGU 2	36
NGU 3	25

Range = 11-36 mm; Mean = 24 mm

**McNeil core data for percent fines <0.85 mm as the mean of 8 samples for the North Fork Gualala Subbasin.**  
**Source=GRI and GRWC, 2001.**

<b>Site</b>	<b>1992</b>	<b>1993</b>	<b>1994</b>	<b>1995</b>	<b>1996</b>	<b>1997</b>
dot256		16	11	17	17	17
dry211			17	16	15	12
Inf255		19		12	24	28
Inf201	11	21	20	21	15	16
Inf202		12	13	18	18	22
Inf203		17	20	11	20	19
mcg209				19	27	20
rob207				15	18	18

**Median particle size data (mm) as the mean of 3 transects for the Buckeye Creek Subbasin.**  
**Source=GRI and GRWC, 2001.**

<b>Site</b>	<b>1997</b>	<b>1998</b>	<b>2000</b>
buc223	25		37
buc224	26		
buc231	24	24	

**Median particle size data (mm) as the mean of 3 transects for the Rockpile Creek Subbasin.**  
**Source=GRI and GRWC, 2001.**

<b>Site</b>	<b>1997</b>	<b>1998</b>	<b>1999</b>
roc221	27	25	32
roc275	26		
roc401	28		

**Surface Water Ambient Monitoring Data (SWAMP) from year 2001 sampling.**

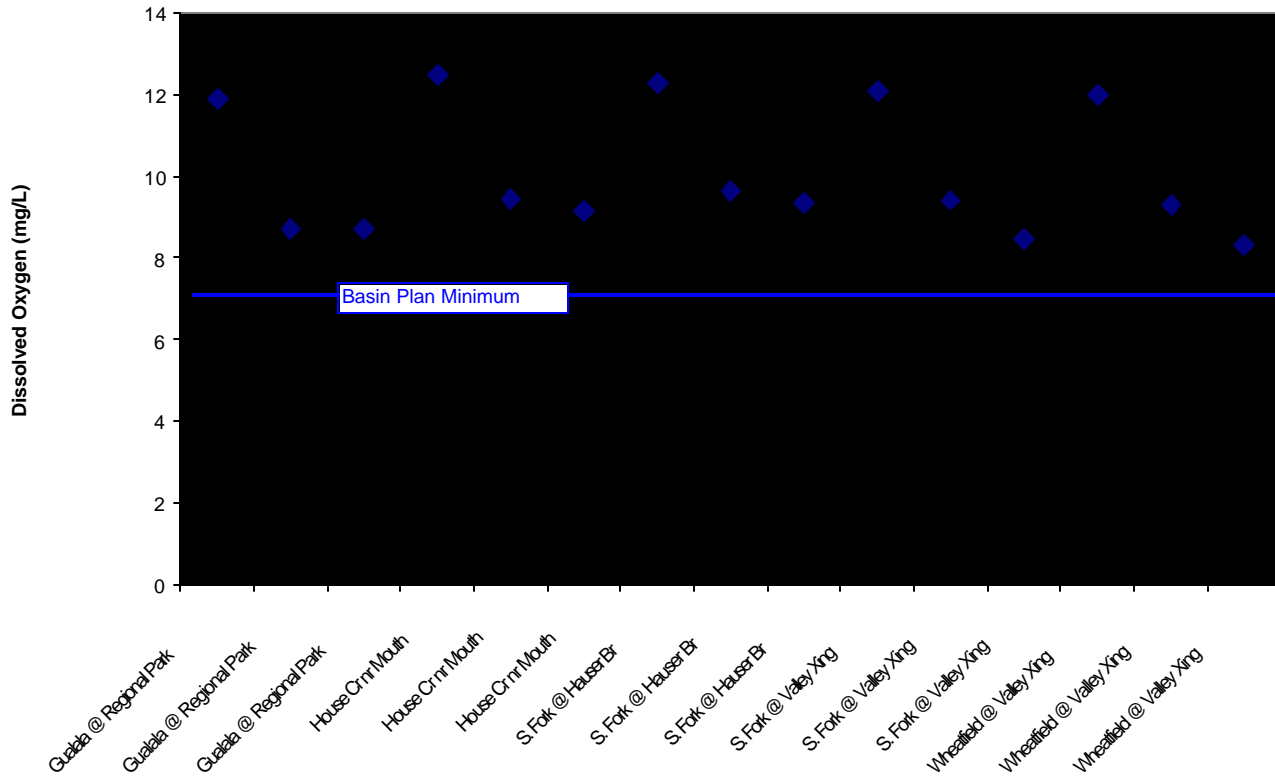
<b>Sample Location</b>	<b>Date</b>	<b>Time</b>	<b>Diss. Oxygen mg/L</b>	<b>pH</b>	<b>Specific Cond. umho/ cm</b>	<b>Water Temp (C)</b>	<b>Air Temp (C)</b>	<b>Turb (FTU)</b>	<b>Total Alk mg/L</b>	<b>Ammonia-N mg/L</b>	<b>Nitrate-N mg/L</b>	<b>Kjeldahl-N mg/L</b>
Gualala @ Regional Park	2/13/01	1515	11.9	7.22	156	7.7	15	20				
Gualala @ Regional Park	5/8/01	1320	8.7	6.78	235	18.6	18		86	<0.050	<0.050	<0.50
Gualala @ Regional Park	6/27/01	1455	8.7	7.72	193	16.1	14.5	0.87	78	<0.050	<0.050	<0.50
House Cr nr Mouth	2/13/01	1142	12.5	7.93	170	6.6	14	11				
House Cr nr Mouth	5/8/01	1135	9.45	7.75	321	21.1	27		152	<0.050	<0.050	<0.50
House Cr nr Mouth	6/27/01	1250	9.15	8.56	256	18	16	0.6	130	<0.050	<0.050	<0.50
S. Fork @ Hauser Br	2/13/01	1005	12.3	7.54	122	5.7	7.5	14				
S. Fork @ Hauser Br	5/8/01	1030	9.65	7.03	212	15.7	24.5		98	<0.050	<0.050	<0.50
S. Fork @ Hauser Br	6/27/01	1200	9.34	8.18	202	16.7	15.5	1.7	82	<0.050	<0.050	<0.50
S. Fork @ Valley Xing	2/13/01	1415	12.1	7.26	135	6.9	18.5	15				
S. Fork @ Valley Xing	5/8/01	1255	9.42	6.87	235	18.8	19.5		88	<0.050	<0.050	<0.50
S. Fork @ Valley Xing	6/27/01	1415	8.48	7.88	259	16.9	14.5	0.68	100	0.24	<0.050	<0.50
Wheatfield @ Valley Xing	2/13/01	1355	12	7.32	147	7.9	19	17				
Wheatfield @ Valley Xing	5/8/01	1235	9.28	6.9	252	18.5	22		112	<0.050	<0.050	<0.50
Wheatfield @ Valley Xing	6/27/01	1345	8.3	7.84	244	17.5	15	0.18	100	<0.050	<0.050	<0.50

**Surface Water Ambient Monitoring Data (SWAMP) from year 2001 sampling (cont'd).**

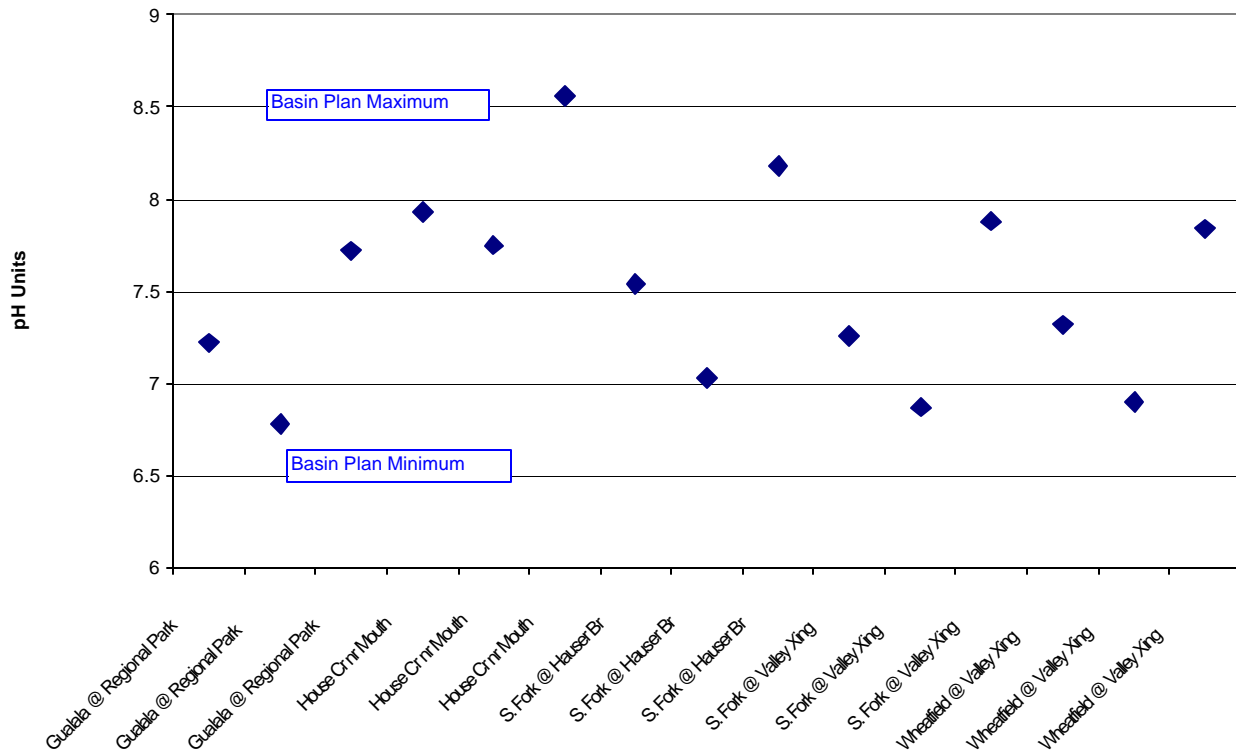
<b>Sample Location</b>	<b>Date</b>	<b>Time</b>	<b>Ortho-phosphate-P mg/L</b>	<b>Chl-a mg/L</b>	<b>Hardness mg/L</b>	<b>Heavy Metals *</b>	<b>Minerals</b>
Gualala @ Regional Park	2/13/01	1515					
Gualala @ Regional Park	5/8/01	1320	<0.050		92.9	ND	minerals will be reported in a later draft
Gualala @ Regional Park	6/27/01	1455	<0.050	<0.00050	68	ND	
House Cr nr Mouth	2/13/01	1142					
House Cr nr Mouth	5/8/01	1135	<0.050		158	ND	
House Cr nr Mouth	6/27/01	1250	<0.050	0.0014	130	ND	
S. Fork @ Hauser Br	2/13/01	1005					
S. Fork @ Hauser Br	5/8/01	1030	<0.050		83.7	ND	
S. Fork @ Hauser Br	6/27/01	1200	<0.050	<0.00050	84	ND	
S. Fork @ Valley Xing	2/13/01	1415					
S. Fork @ Valley Xing	5/8/01	1255	<0.050		99.8	ND	
S. Fork @ Valley Xing	6/27/01	1415	<0.050	<0.00050	110	ND	
Wheatfield @ Valley Xing	2/13/01	1355					
Wheatfield @ Valley Xing	5/8/01	1235	<0.050		101	ND	
Wheatfield @ Valley Xing	6/27/01	1345	<0.050	0.0013	99	ND	

\* Metals = cadmium, chromium, copper, lead, nickel, zinc, mercury at reporting levels of 10, 10, 10, 75, 30, 20, 0.200 ug/L, respectively

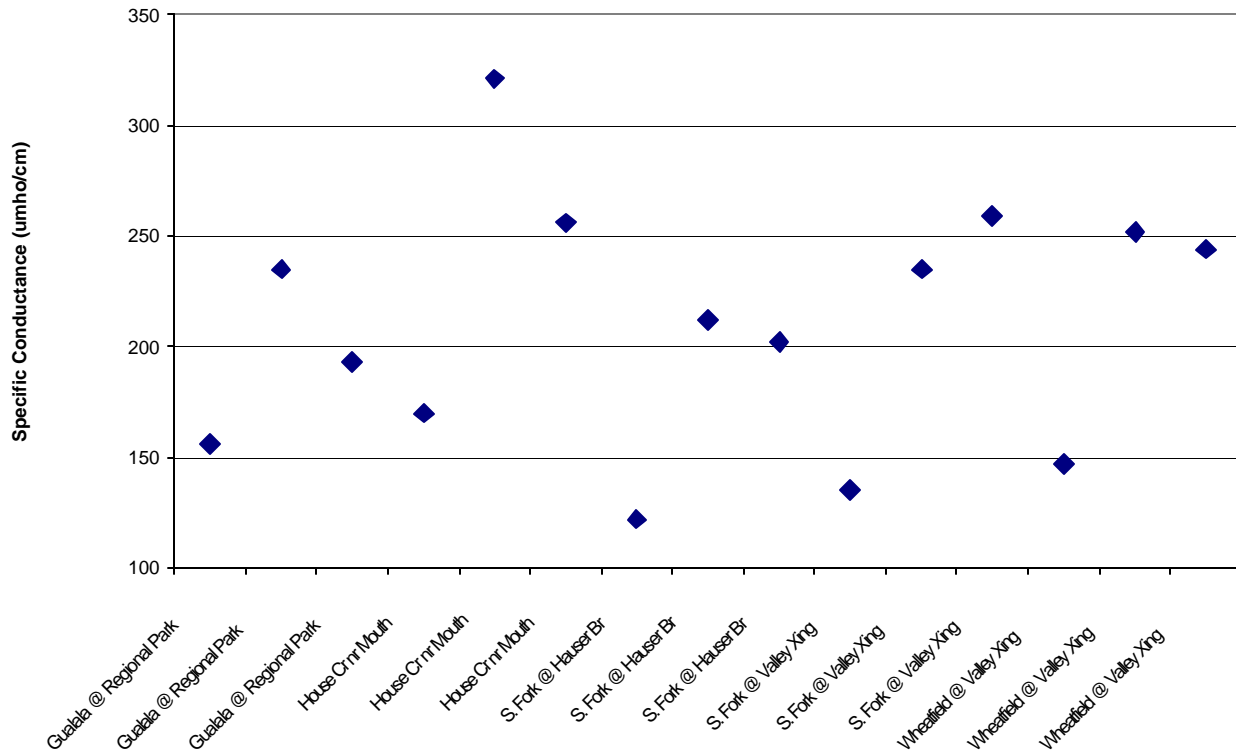
Dissolved Oxygen at Gualala Stations - 2001 (SWAMP)



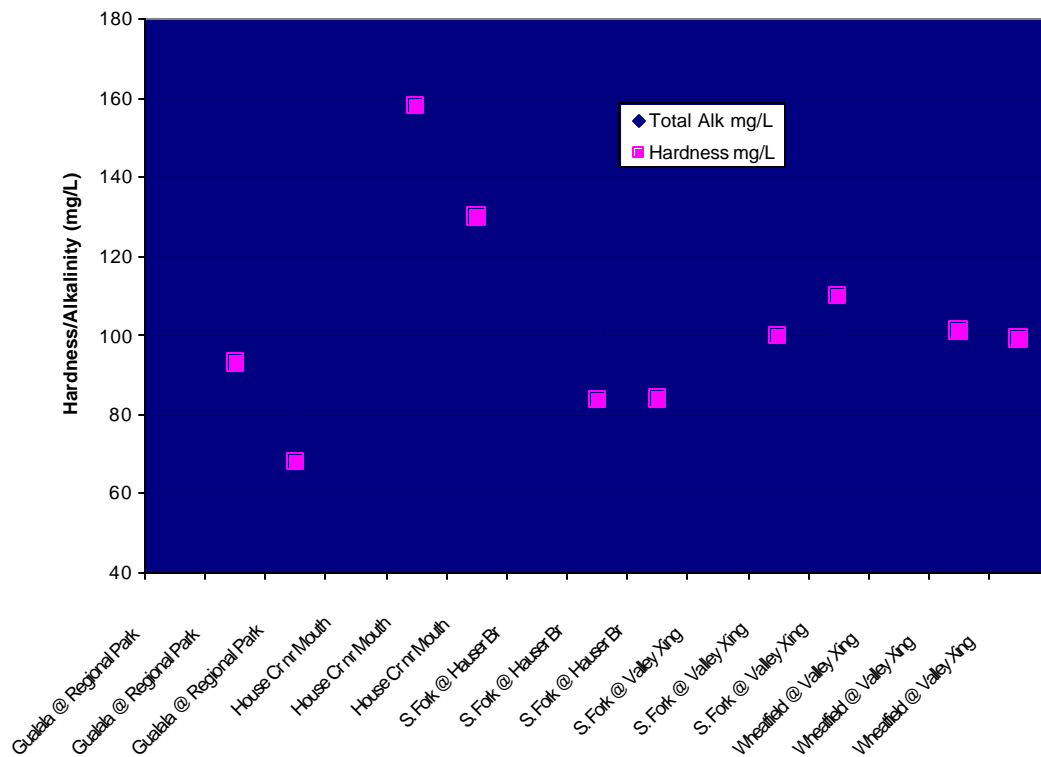
pH at Gualala Stations - 2001 (SWAMP)



Specific Conductance at Gualala Stations - 2000 (SWAMP)



Alkalinity and Hardness at Gualala Stations - 2000 (SWAMP)





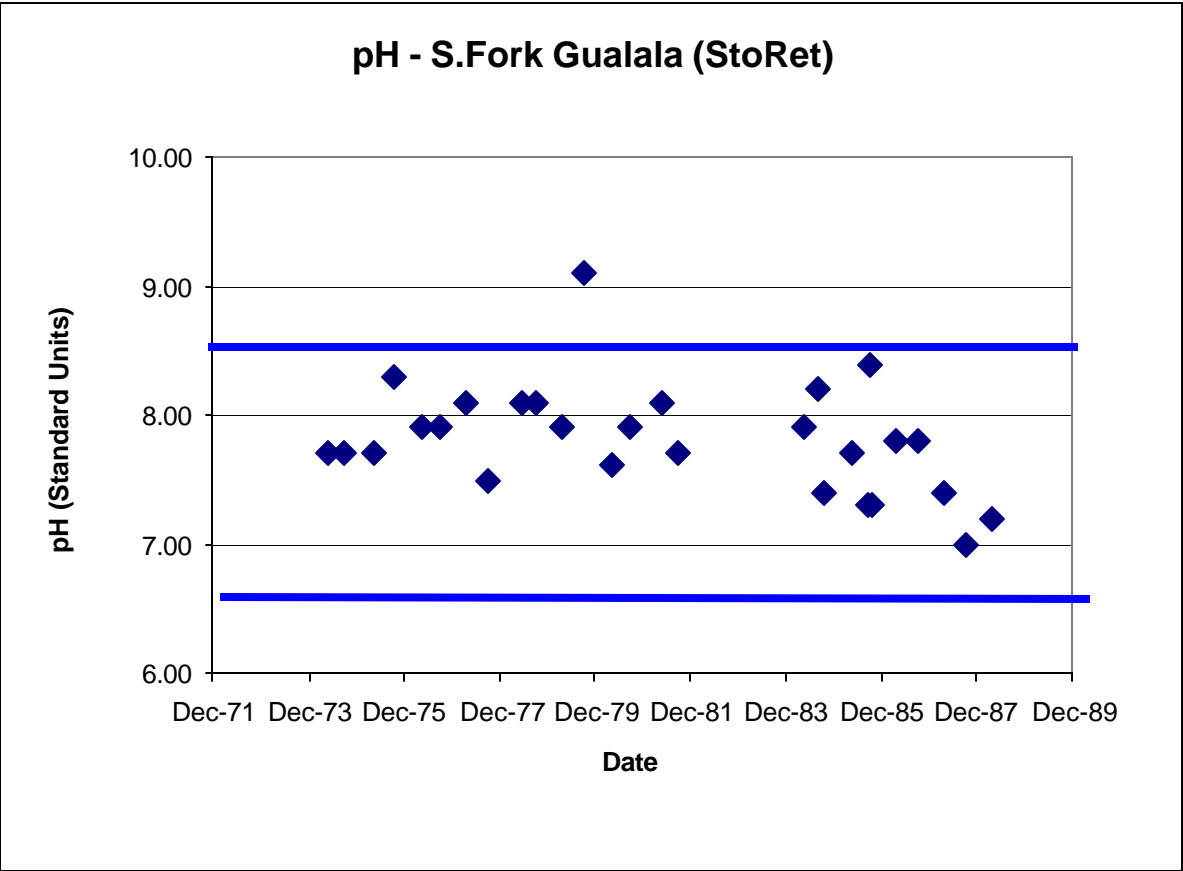
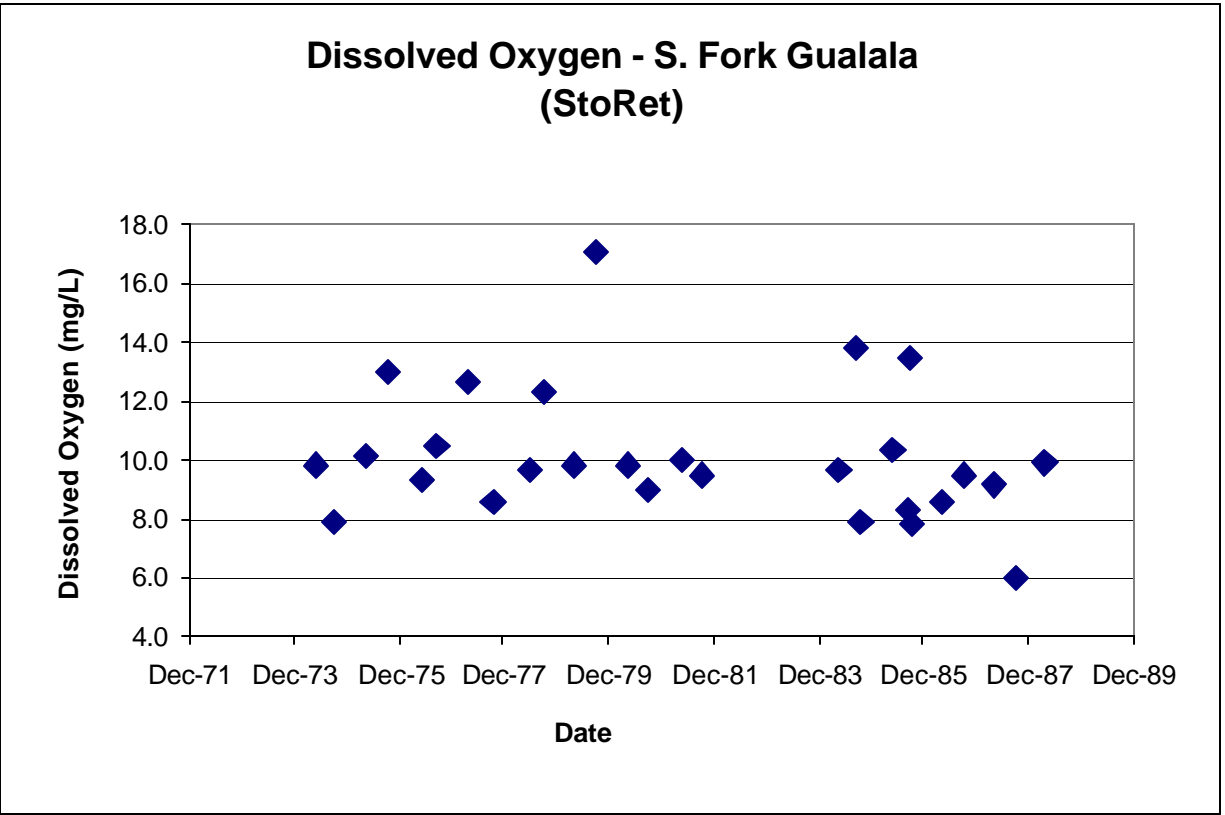
**StoRet Data for the South Fork Gualala River near Valley Crossing**

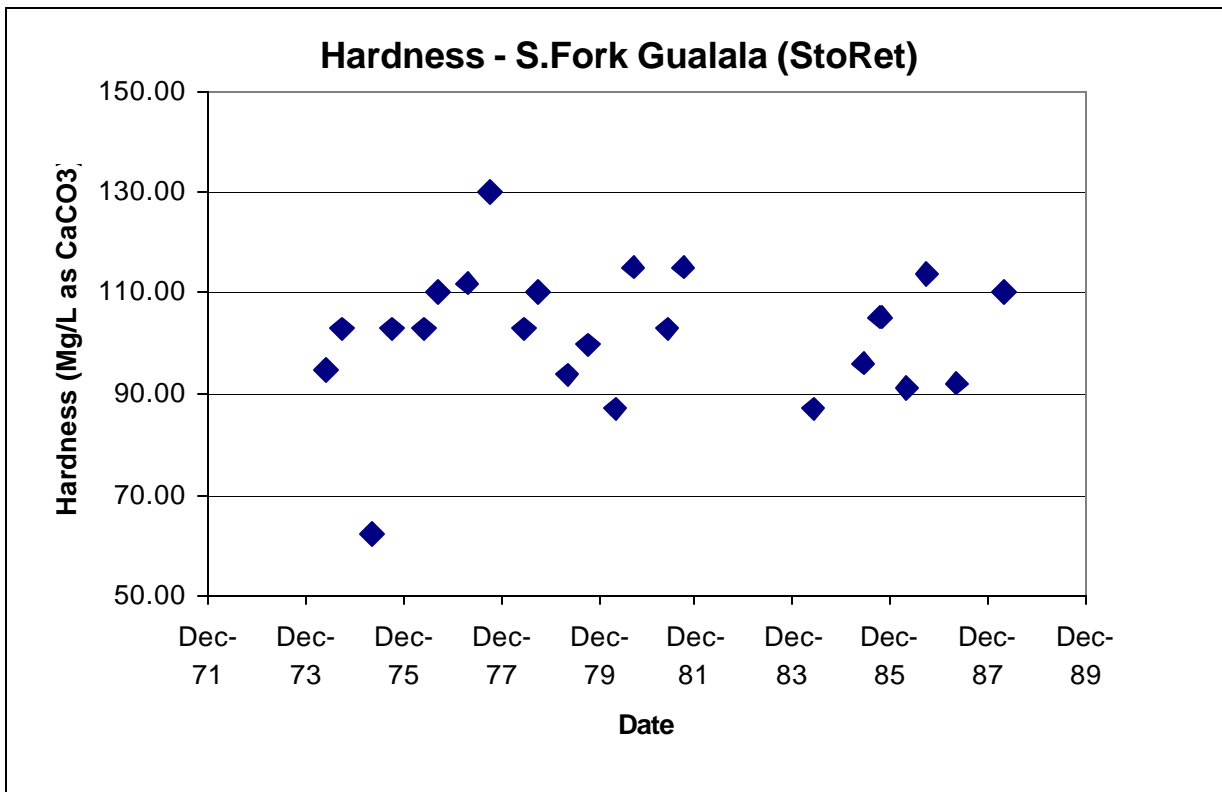
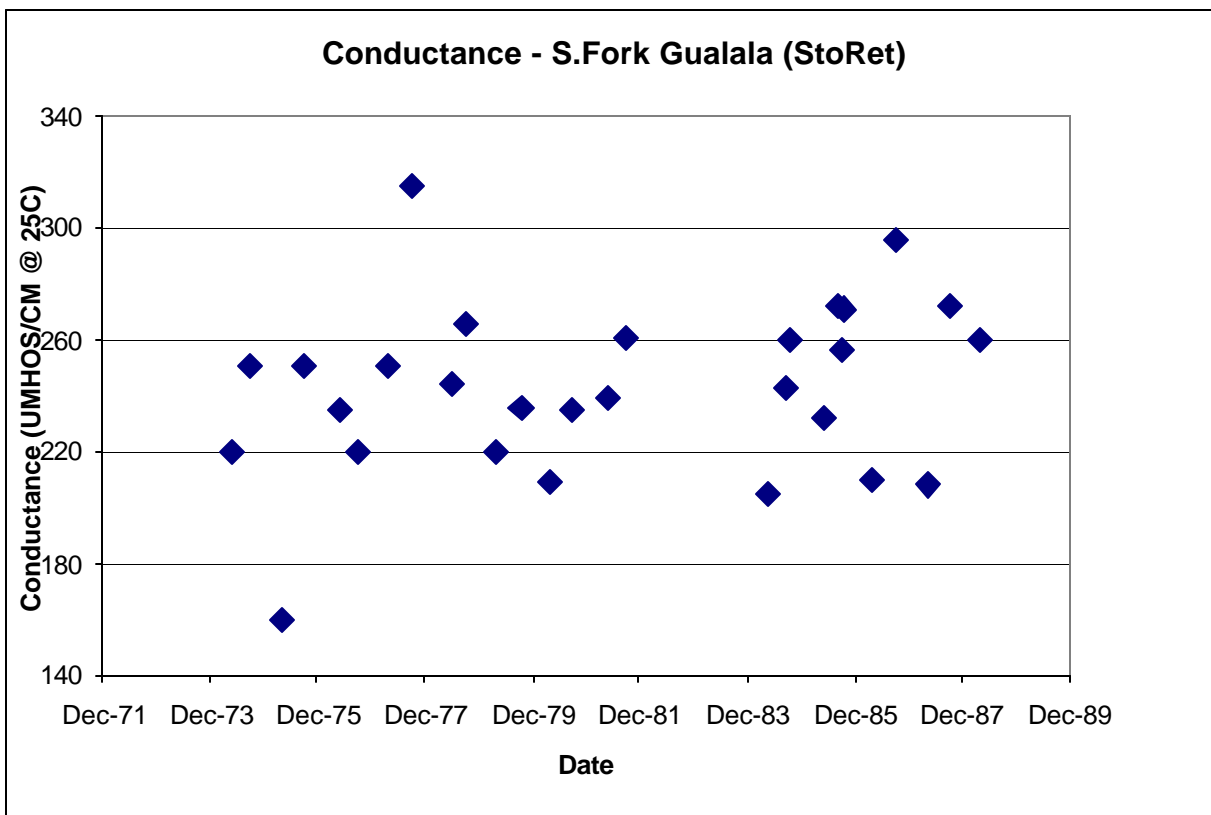
GUALALA R S F NR ANNAPOLIS, CA WATER RES CNTRL BD, F8110000,38.702778 LAT, 123.416667 LONG, HUC 18010109

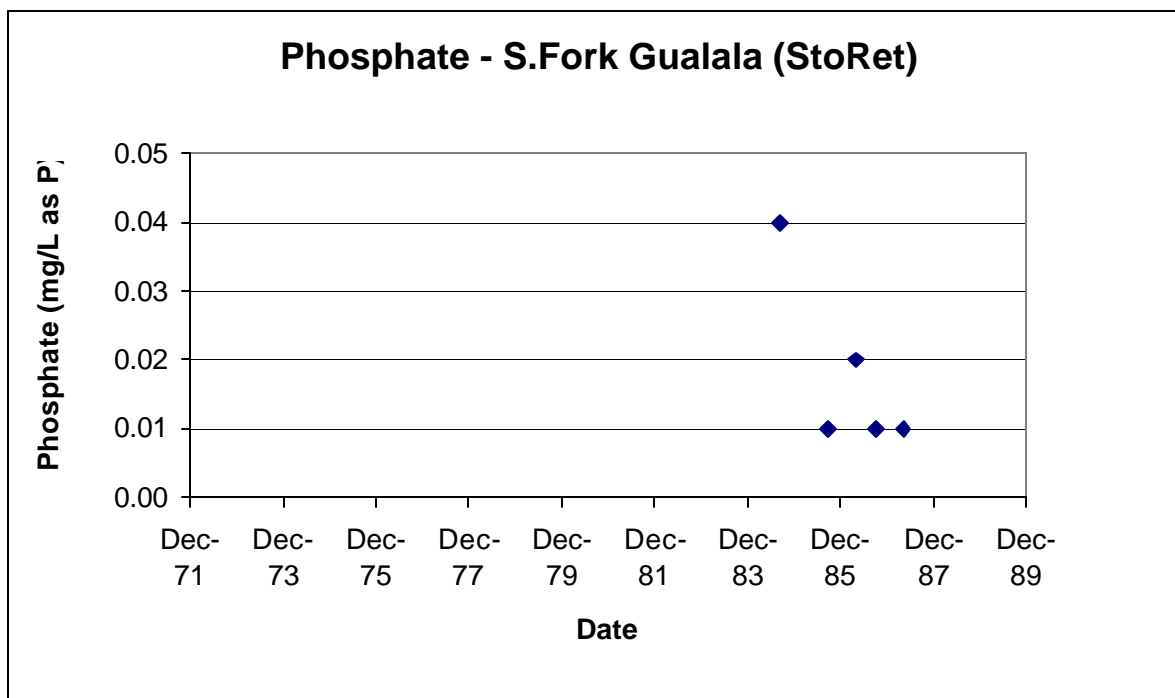
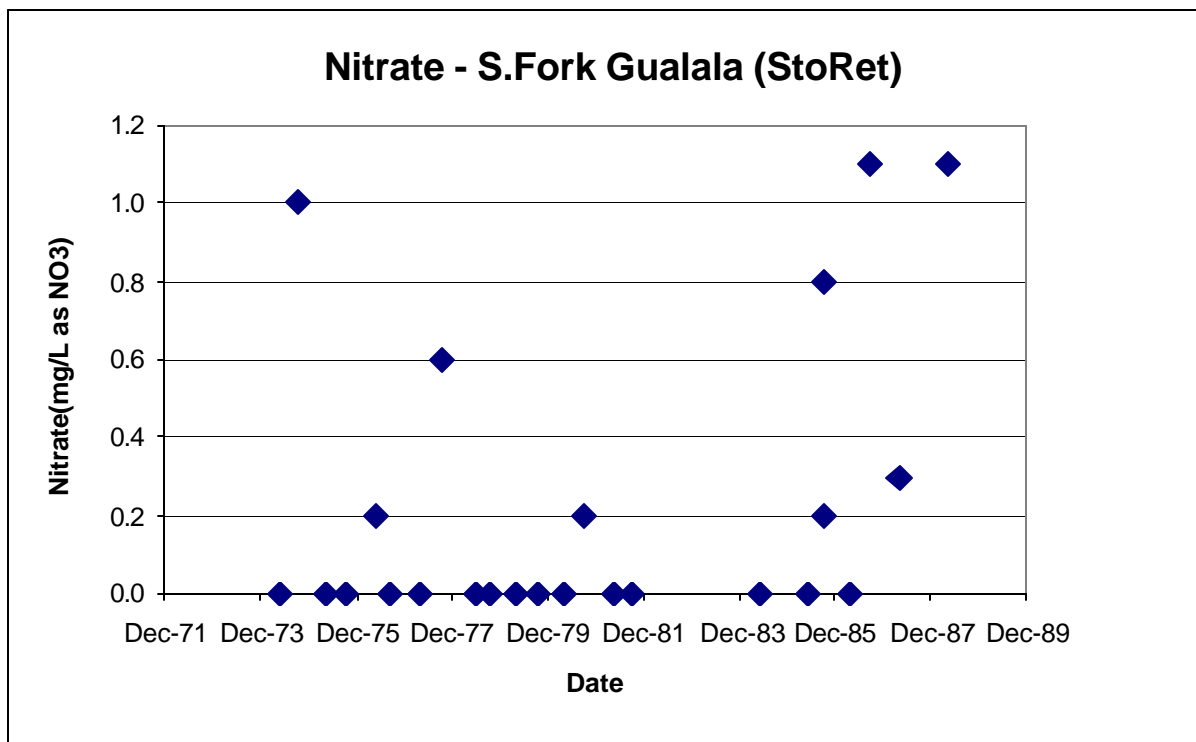
START DATE	START TIME	WATER TEMP (C)	WATER TEMP (F)	FIELD SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	TURBIDITY, HACH TURBIDIMETER (FORMAZIN TURB UNIT)	DISS OXYGEN (MG/L)	DISS OXYGEN (% SAT)	PH (STANDARD UNITS)
21-May-74	1550	18.3	65	220	1	9.8	103.34	7.7
11-Sep-74	1330	20.6	69	250	1	7.9	87.94	7.7
24-Apr-75	1530	11.7	53	160	90	10.2	94.61	7.7
18-Sep-75	1600	20.0	68	250	0	13.0	141.56	8.3
14-May-76	1000	17.8	64	235	0	9.3	98.07	7.9
3-Sep-76	1030	19.4	67	220	0	10.5	111.90	7.9
12-Apr-77	1230	17.8	64	250	0	12.7	133.93	8.1
21-Sep-77	1430	20.6	69	315	0	8.6	95.73	7.5
9-Jun-78	1545	22.8	73	244	0	9.7	111.70	8.1
21-Sep-78	1415	20.6	69	266		12.3	136.91	8.1
18-Apr-79	1545	15.6	60	220		9.8	98.18	7.9
19-Sep-79	1400	24.4	76	236	0	17.1	201.54	9.1
16-Apr-80	1415	17.2	63	209		9.8	101.21	7.6
4-Sep-80	1115	18.3	65	235		9.0	94.91	7.9
6-May-81	1350	18.3	65	239		10.0	105.45	8.1
16-Sep-81	1445	22.2	72	261		9.5	108.15	7.7
3-May-84	1215	15.6	60	205		9.7	97.17	7.9
23-Aug-84	1740	22.2	72	243		13.8	157.10	8.2
25-Sep-84	1210	17.2	63	260		7.9	81.59	7.4
8-May-85	1345	17.8	64	232		10.3	108.62	7.7
27-Aug-85	1045	19.0		272	1	8.3	88.46	7.3
12-Sep-85	1345	20.6	69	256	2	13.5	150.27	8.4
26-Sep-85	1045	17.2		271	1	7.8	80.56	7.3
10-Apr-86	1030	14.7		210	1	8.6	84.47	7.8
11-Sep-86	840	17.5		296	1	9.5	98.11	7.8
14-Apr-87	1300	15.5		208		9.2	90.36	7.4
10-Sep-87	845	17.9		272		6.0	63.27	7.0
6-Apr-88	1500	15.8		260		9.9	99.18	7.2

**StoRet Data for the South Fork Gualala River near Valley Crossing (cont'd.)**

<b>START DATE</b>	<b>START TIME</b>	<b>TOTAL ALKALINITY (MG/L AS CaCO3)</b>	<b>ALKALINITY, FILTERED SAMPLE (AS CaCO3 MG/L)</b>	<b>TOTAL HARDNES S (MG/L AS CaCO3)</b>	<b>DISS NITRATE NITROGEN (MG/L AS NO3)</b>	<b>PHOSPHORUS, TOTAL ORTHOPHOSPHATE (MG/L AS P)</b>	<b>METALS</b>
21-May-74	1550	94		95	0.0		All Nondetect
11-Sep-74	1330	108		103	1.0		
24-Apr-75	1530	61		62	0.0		
18-Sep-75	1600	109		103	0.0		
14-May-76	1000	105		103	0.2		
3-Sep-76	1030	114		110	0.0		
12-Apr-77	1230	109		112	0.0		
21-Sep-77	1430	129		130	0.6		
9-Jun-78	1545	100		103	0.0		
21-Sep-78	1415	113		110	0.0		
18-Apr-79	1545			94	0.0		
19-Sep-79	1400			100	0.0		
16-Apr-80	1415			87	0.0		
4-Sep-80	1115		112	115	0.2		
6-May-81	1350		103	103	0.0		
16-Sep-81	1445		114	115	0.0		
3-May-84	1215		86	87	0.0		
23-Aug-84	1740					0.04	
8-May-85	1345		100	96	0.0		
27-Aug-85	1045					0.01	
12-Sep-85	1345		111	105	0.2		
26-Sep-85	1045		109	105	0.8		
10-Apr-86	1030		92	91	0.0	0.02	
11-Sep-86	840		117	114	1.1	0.01	
14-Apr-87	1300		89	92	0.3	0.01	
10-Sep-87	845						
6-Apr-88	1500		101	110	1.1		All Nondetect









**StoRet Data for the Wheatfield Fork Gualala River near Valley Crossing**

WHEATFIELD FK GUALALA R @ BERK YMCA CAMP CA WATER RES CNTRL BD WB01B138401000138.669444 LAT 123.298611 LONG  
HUC 18010109

START DATE	START TIME	WATER TEMP (C)	TURBIDITY ,LAB (NTU)	SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	PH, LAB (STANDAR D UNITS)	TOTAL ALKALINITY (MG/L AS CACO3)	TOTAL NITRATE NITROGEN (MG/L AS N)	TOTAL NITRITE NITROGEN (MG/L AS N)
6-Jan-88	1300	10	36.0	140	8.00	80	0.04	<0.03
3-Jun-88	1400	22	1.6	320	8.30	140	0.05	<0.03

START DATE	START TIME	TOTAL HARDNESS (MG/L AS CACO3)	PHOSPHORUS, TOTAL ORTHOPHOSPHATE (MG/L AS P)	DISS OXYGEN (MG/L)	DISS OXYGEN (% SAT)	AMMONIA, UNIONIZED (MG/L AS N)	METALS
6-Jan-88	1300	62.00	0.02	12.60	112	0.00	All Nondetect
3-Jun-88	1400	120.00	0.05	8.70	99	0.00	All Nondetect

# StoRet Data for the Mainstem Gualala River near Gualala

GUALALA R NR GUALALA CA WATER RES CNTRL BD F810070038.775556 LAT 123.498611 LONG  
HUC 18010109

START DATE	START TIME	AIR TEMP (C)	WATER TEMP (F)	DISS NITRATE NITROGEN (MG/L AS N)	FIELD SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)	TURBIDITY,HACH TURBIDIMETER (FORMAZIN TURB UNIT)
13-Feb-75	2500			0.50	87	500
14-Sep-76	1040	18.3	65	0.03	220	
14-Sep-76	1815	18.3			216	1
14-Sep-76	2130	17.0			218	1
15-Sep-76	500	15.0			218	1
15-Sep-76	820	15.0			218	
15-Sep-76	1100	17.8			218	
30-Nov-76	1430	11.1			230	3
1-Dec-76	930	7.8	46	0.00	230	0
1-Dec-76	1705	11.0			220	1
1-Dec-76	2045	9.5			244	2
2-Dec-76	545	8.0			232	1
2-Dec-76	900	9.0				1
2-Dec-76	1200	9.5				1
8-Mar-77	1600	15.6			240	
9-Mar-77	1530	13.0		0.04	225	0
9-Mar-77	1800	12.8			233	1
9-Mar-77	2100	11.7			235	1
10-Mar-77	530	8.9			232	1
10-Mar-77	1000	10.0			240	1
17-Mar-77	1130	11.8			210	5
24-May- 77	1315	20.0			250	
25-May- 77	830	14.4			245	
25-May- 77	1740	17.2	63	0.26	245	0
25-May- 77	1900	15.0			215	
26-May- 77	945	15.6			235	
27-May- 77	700	13.3			240	
13-Oct-77	1620	16.7	62	0.00	240	
14-Oct-77	520	12.8			240	
14-Oct-77	830	12.8			240	
4-Apr-85	1235	16.7	62		176	3

**StoRet Data for the Mainstem Gualala River near Gualala (cont'd.)**

<b>START DATE</b>	<b>START TIME</b>	<b>DISS OXYGEN (MG/L)</b>	<b>DISS OXYGEN (% SAT)</b>	<b>PH (STANDARD UNITS)</b>	<b>PH, LAB (STANDARD UNITS)</b>	<b>SPECIFIC CONDUCTANCE (UMHOS/CM @ 25C)</b>
13-Feb-75	2500				7.4	
14-Sep-76	1040	11.0	116.04		8.2	210
14-Sep-76	1815	8.5	89.67		7.3	214
14-Sep-76	2130	8.5	87.82		7.5	218
15-Sep-76	500	7.8	76.64		7.4	218
15-Sep-76	820	8.7	85.48		7.4	
15-Sep-76	1100	10.1	106.55		7.3	
30-Nov-76	1430	12.9	116.47		7.6	232
1-Dec-76	930	11.7	98.53		8.0	227
1-Dec-76	1705	8.0	72.23		7.4	244
1-Dec-76	2045	10.0	86.39		7.5	
2-Dec-76	545	10.4	87.58		7.6	
2-Dec-76	900	11.1	95.90		7.5	232
2-Dec-76	1200	12.1	104.54		7.5	230
8-Mar-77	1600	11.8	118.26		8.1	
9-Mar-77	1530	12.9	121.96		8.1	226
9-Mar-77	1800	11.4	107.78		7.8	233
9-Mar-77	2100	11.6	107.64		8.0	
10-Mar-77	530	11.2	96.76		7.7	224
10-Mar-77	1000	12.3	109.09		7.7	234
17-Mar-77	1130	10.7	99.29	7.5	7.7	215
24-May-77	1315	10.3	112.20	7.4		
25-May-77	830	10.8	104.07	7.4		
25-May-77	1740	11.1	114.68	7.6	8.1	235
25-May-77	1900	6.6	64.85	7.0		
26-May-77	945	11.0	110.24	7.6		
27-May-77	700	10.7	101.16			
13-Oct-77	1620	10.3	106.42	7.4	8.3	188
14-Oct-77	520	8.3	78.47	7.3		
14-Oct-77	830	9.0	85.09	7.3		
4-Apr-85	1235	10.0	103.32	7.4		

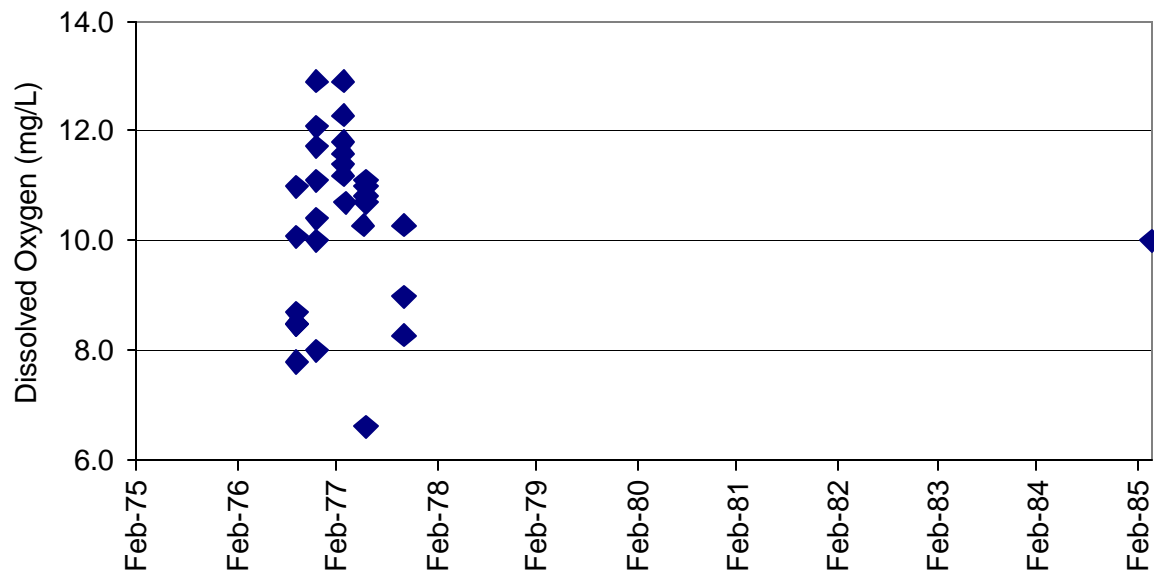
**StoRet Data for the Mainstem Gualala River near Gualala (cont'd.)**

<b>START DATE</b>	<b>START TIME</b>	<b>TOTAL ALKALINITY (MG/L AS CaCO3)</b>	<b>DISS NITRATE NITROGEN (MG/L AS NO3)</b>	<b>UNIONIZED AMMONIA (MG/L)</b>	<b>TOTAL NITROGEN, AMMONIA (MG/L AS N)</b>	<b>TOTAL HARDNES S (MG/L AS CaCO3)</b>
13-Feb-75	2500		0.50			33.86
14-Sep-76	1040	94	0.03	0.00	0.01	87.00
14-Sep-76	1815					
14-Sep-76	2130					
15-Sep-76	500					
15-Sep-76	820					
15-Sep-76	1100					
30-Nov-76	1430					
1-Dec-76	930	98	0.00	0.00	0.00	91.00
1-Dec-76	1705					
1-Dec-76	2045					
2-Dec-76	545					
2-Dec-76	900					
2-Dec-76	1200					
8-Mar-77	1600					
9-Mar-77	1530	94	0.04	0.00	0.00	92.00
9-Mar-77	1800					
9-Mar-77	2100					
10-Mar-77	530					
10-Mar-77	1000					
17-Mar-77	1130					
24-May-77	1315					
25-May-77	830					
25-May-77	1740	99	0.26	0.00	0.00	92.82
25-May-77	1900					
26-May-77	945					
27-May-77	700					
13-Oct-77	1620	78	0.00	0.00	0.00	77.00
14-Oct-77	520					
14-Oct-77	830					
4-Apr-85	1235					

**StoRet Data for the Mainstem Gualala River near Gualala (cont'd.)**

<b>START DATE</b>	<b>START TIME</b>	<b>PHOSPHORUS, DISSOLVED ORTHOPHOSPHATE (MG/L AS P)</b>	<b>METALS</b>
13-Feb-75	2500		All Nondetect
14-Sep-76	1040	0.04	All Nondetect
14-Sep-76	1815		
14-Sep-76	2130		
15-Sep-76	500		
15-Sep-76	820		
15-Sep-76	1100		
30-Nov-76	1430		
1-Dec-76	930	0.02	
1-Dec-76	1705		
1-Dec-76	2045		
2-Dec-76	545		
2-Dec-76	900		
2-Dec-76	1200		
8-Mar-77	1600		
9-Mar-77	1530	0.03	
9-Mar-77	1800		
9-Mar-77	2100		
10-Mar-77	530		
10-Mar-77	1000		
17-Mar-77	1130		
24-May-77	1315		
25-May-77	830		
25-May-77	1740	0.01	
25-May-77	1900		
26-May-77	945		
27-May-77	700		
13-Oct-77	1620	0.03	
14-Oct-77	520		
14-Oct-77	830		
4-Apr-85	1235		

### Dissolved Oxygen - Gualala (StoRet)



### pH - Gualala (StoRet)

